

# Computers Help Reprogram Injured Brains

Maureen Hoepfer

Cognitive prosthetics is a new frontier. It seeks to find an artificial substitute for injured brain processes by using computers and other technologies. In recent years, the Physicians' Health Programs of The Educational and Scientific Trust of the Pennsylvania Medical Society has been working with the Institute for Cognitive Prosthetics to develop innovative therapies to help physicians with brain injuries return to a productive life.

**A** cognitive deficit is no longer the "kiss of death" for a physician's career, according to Penelope Ziegler, MD, medical director of the Physicians' Health Programs (PHP). Creative technologies, designed to assist people with cognitive disabilities, have helped several physicians "bridge" their deficits and return to medical practice.

"Of those physicians with physical problems who we [the PHP] have worked with, the most challenging have been the cognitively impaired," says Dr. Ziegler. "Most of the doctors who call us about their cognitive problems have consulted two or three other sources, and have been told to forget practicing and just retire. Unfortunately, we must also give that same advice to some physicians, but there have been several who were excellent candidates for rehabilitation. These have been able to return to practice."

## Building bridges

Dr. Ziegler credits the Institute for Cognitive Prosthetics (ICP), based in Bala Cynwyd, for the PHP's success in getting these cognitively impaired physicians back to work. The institute develops customized computer programs to help brain-injury patients overcome specific problems. Conventional cognitive rehabilitation tries to correct a cluster of individual cognitive deficits, e.g., problems with memory and language skills. In contrast, the institute uses technology to build a bridge across the deficits. "In every case, the impact on

the physician has been profound," Dr. Ziegler says.

This innovative treatment modality, called computer-based cognitive prosthetics (CBCP), is fundamentally different from traditional cognitive rehabilitation modalities in that it immediately assists the patient in performing targeted activities important to the patient. It attempts to find an artificial substitute for malfunctioning brain processes, thus reducing the impact of the deficits, Dr. Ziegler explains. For example, ICP has developed customized interventions, such as word processing software, schedulers, and other personal productivity tools for desktop or notebook PCs, to help patients compensate for cognitive impairments.

Dr. Ziegler cites the case of Dr. T, a physician in his mid-50s, who was practicing in a demanding, hospital-based specialty when his colleagues noticed he was having memory problems. Initial neurological examinations substantiated Dr. T's memory dysfunction. After a series of tests and therapies, the neurological assessment indicated profound deficits in immediate and short-term memory for both verbal and non-verbal material. He was unable to retain newly learned information after one-half hour. However, his long-term memory, including what he learned in medical school, remained intact. Dr. T's cognitive dysfunction resulted in several crises, and he was counseled to turn to the PHP.

The PHP, working with ICP, designed a contract that protected Dr. T's medical license while he was undergoing treatment. Knowing he was not capable of practicing at that time, Dr. T willingly gave up his right to practice independently. Dr. T's first CBCP intervention helped him with his daily schedule. Regaining control over this part of his life was important to him.

Evaluations showed that Dr. T was capable of executing tasks on his own, but he needed to be reminded. ICP staff designed a system where Dr. T would plan each day on a personal computer and then send himself reminders, via beeper, at specific

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Elliot Cole, PhD (left), founded the Institute of Cognitive Prosthetics in 1989 to offer highly specialized, computer-based rehabilitation services to brain-injured patients. Pictured with Dr. Cole are Linda Petti, PhD (center), a cognitive psychologist employed by the institute, and Michael K. Matthews Jr., MD, PhD (right), a Philadelphia neurologist who works on clinical and research projects at the institute.

times during the day, to review the schedule.

After a while, Dr. T began practicing part time in a less demanding specialty at a local hospital under close supervision. He demonstrated that his medical knowledge and technique were intact, and his memory deficit did not impair his ability to record necessary information. He succeeded in his work trial, and his hours were gradually expanded. Dr. T now practices full time, still under supervision; but more importantly, Dr. Ziegler says, his professional dignity and personal satisfaction have been restored.

#### Using business tactics

Dr. T's case is only one of the institute's many success stories. Established in 1989 by a computer scientist, Elliot Cole, PhD, the institute takes on the "impossible cases"—patients who have stopped improving using traditional therapy. Most of ICP's patients are at least one year post-injury and are confronting the impact of their disabilities, Dr. Cole explains. Because no two brain injuries are alike, each rehabilitation plan and intervention package is customized to the patient.

He explains that in developing these individualized plans, ICP follows some basic tenets used in successful businesses:

- *Customer-driven*—With each new patient, staff first ask the patient what he or she wants to accomplish. "We have a much more patient-driven approach than traditional health care. The interventions and treatments are built around what the

patient tells us are his or her needs and the needs of family members," Dr. Cole explains.

- *Participatory design*—Staff work with each patient to develop the rehabilitation plan and, if appropriate, the needed computer software. Staff members visit the patient's home, talk to the patient and the family, and see how the patient functions in his or her environment. "The patient is involved in every step of the process. Participatory design works so well because users understand all the small details that create their work or environment," Dr. Cole says. "It's the small details that are so important to making a process work."

- *Cost-effective*—Dr. Cole contends that ICP offers treatment that is less expensive, takes less time, and delivers greater recovery than many traditional rehabilitation methods. The overall cost per patient is substantially lower because a patient usually spends less time in a hospital or rehabilitation center. Also, because CBCP assists the patient in performing activities they could not do after suffering a brain injury, many patients derive success from a relatively short course of treatment. They are able to return to work more quickly, thus saving on disability costs. Most insurance companies cover ICP services, he adds.

- *Easy access*—Because of technology, Dr. Cole says, the institute can provide services to patients anywhere in the United States and Canada from its office in Bala Cynwyd. Also, patients have 24-hour access to ICP staff.

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### Research potential

Michael K. Matthews Jr., MD, PhD, associate professor of neurology and chief of the Division of Behavioral Neurology at Medical College of Pennsylvania and Hahnemann University, has worked with Dr. Cole and ICP staff for more than two years on clinical and research projects. He shares the institute's philosophy of "finding practical ways to help brain-injured patients do what they want to do."

Cognitive prosthetics is a new frontier offering a potential breakthrough not only in cognitive rehabilitation, but also in research, Dr. Matthews says. Because CBCP is technology based, it lends itself to quantitative research. ICP staff are able to record and analyze a substantial amount of data about each patient's everyday performance and progress. "These data may help tell us more about how the cognitive system works as a whole. ICP techniques provide a 'window' for studying cognition at the level of goal-directed behavior."

### Success with high achievers

The ICP staff is particularly proud of what has been accomplished with patients described as "high achievers," says Linda Petti, PhD, a cognitive psychologist at the institute. Dr. Petti explains that high achievers, such as physicians, make excellent progress with CBCP because they are very involved in the development of their prosthetic interventions.

"Many rehabilitation programs treat high achievers like all other patients, and a therapist designs a rehabilitation plan that he or she thinks is best for the patient," Dr. Petti says. In contrast, ICP takes advantage of the fact that high achievers are used to exercising considerable control over various facets of their lives. Before suffering a brain injury, they routinely faced and

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solved challenges presented to them. "We give them back that element of control, which in turn significantly impacts on their motivation, and ultimately, their progress," she explains. "TCP lets the patient take the lead in identifying the challenges and developing a plan to master them."

Although PHP has worked with the institute on only a small number of cases, Dr. Ziegler says the experience has been gratifying. "It's been a win-win situation for all. The physician regains control over his or her life and gets back to work, while we [PHP and ICP] get satisfaction from helping the physician. Most importantly, society regains a competent physician." ○

### Resources

**The Institute for Cognitive Prosthetics (ICP)** offers highly specialized neuro-rehabilitation services to patients suffering from an acquired cognitive deficit. ICP has the nation's only neuro-rehabilitation program focusing on the special medical, social, and emotional needs of physicians and their families. Using telemedicine techniques, services are provided to the patient's home and office anywhere in the United States. For more information, call (610) 664-3585.

**The Physicians' Health Programs (PHP)** provides support and advocacy to physicians who are impaired by addiction, suffering from physical or mental disabilities, or experiencing stress related to professional liability litigation and other aspects of medical practice. The program also offers information and support to physicians' families. PHP accepts referrals from colleagues, hospital and office staff, insurance carriers, licensure boards, family members, or any person who is concerned about a physician's well-being. For more information, call (800) 228-7823. In the evenings and on weekends, call the PHP's message line, (717) 558-7817, and a staff member will promptly return your call. All communications are confidential.